WE CLAIM:

1. A method of JPEG compression of an image frame divided up into a plurality of non-overlapping, tiled 8 x 8 pixel blocks B_{ij} where i, j are integers covering all of the blocks in the image frame, comprising:

(a) forming a discrete cosine transform (DCT) of each block B_{ij} of the image frame to produce a matrix of blocks of transform coefficients D_{ij};

(b) calculating a visual importance, I_{ij}, for each block of the image, based upon assigning zeros for flat features and values approaching unity for sharply varying features;

(c) forming a global quantization matrix Q by one of

(i) selecting a standard JPEG quantization table and

(ii) selecting a quantization table such that the magnitude of each quantization matrix coefficient Q_{ij} is inversely proportional to the importance in the image of the corresponding DCT basis vector; and

(d) selecting a linear scaling factor S_{ij} defining bounds over which the image is to be variably quantized;

(e) quantizing the transform coefficients, D_{ijmn}, by an equivalent of dividing them by a factor $S_{min}*Q$, where S_{min} is a user selected minimum scaling factor, and

(f) entropy encoding quantized coefficients T_{ijmn} and $Q *S_{min}$ to create a JPEG image file.

2. A method according to claim 1, wherein step (e) includes rounding $(D_{ijmn}/(S_{min}*Q))$ to the nearest integer to form quantized DCT transformed coefficients T_{ijmn};

(a) setting $T_{ijmn} = 0$ if $round(D_{ijmn}/(Q_{mn}*S_{ij})) = 0$; and

(b) setting $T_{ijmn} = sign(D_{ijmn})*(2\text{^}(ceil(lg(abs(D_{ijmn})+1))-1)-1)$ if $abs(D_{ijmn}) - (2\text{^}(ceil(lg(abs(D_{ijmn})+1))-1)-1)$ is less than or equal to $abs(D_{ijmn}- Q_{mn}S_{ij} * round(D_{ijmn}/(S_{ij}*Q_{mn})))$;

3. A method according to claim 1, including calculating a linear scaling factor S_{ij} equal to $I_{ij}*(S_{max} - S_{min})+ S_{min}$ where S_{min} and S_{max} are user specified to define bounds over which the image will be variably quantized.

4. The method according to claim 1, where I_{ij} is determined by discrete edge detection and summation of transform coefficients.

5. The method according to claim 1,wherein I_{ij} is determined by creating a 24 x 24 matrix of image pixels of DCT coefficients centered on a block B_{ij}, where i and j =1, 2,...8, convolving said 24 x 24 matrix with an edge tracing kernel to produce a convolved matrix, summing center 10 x 10 matrix values of said convolved matrix to produce a summed value, and normalizing said summed value to produce a visual importance, I_{ij}.

6. The method according to claim 1, wherein said Q is formed by calculating an 8 x 8 matrix A by calculating matrix elements A_{mn} of said A according to the formula

$$A_{mn} = \bullet_{(i,j)} I_{ij}(B_{ij})_{mn},$$

calculating elements Q_{mn} of said Q according to the formula

$$Q_{mn} = \max(A_{mn})/A_{mn}$$

and scaling values of Q_{mn} for all values of (m,n) except (0,0) in order to minimize an error between Q and a standard JPEG quantization matrix.

7. A method of JPEG compression of an image frame divided up into a plurality of non-overlapping, tiled 8 x 8 pixel blocks B_{ij} where i, j are integers covering all of the blocks in the image frame, comprising:

(a) forming a discrete cosine transform (DCT) of each block B_{ij} of the image frame to produce a matrix of blocks of transform coefficients D_{ij};

(b) calculating a visual importance, I_{ij}, for each block of the image, based upon assigning zeros for flat features and values approaching unity for sharply varying features;

(c) forming a global quantization matrix Q by one of

(i) selecting a standard JPEG quantization table and

(ii) selecting a quantization table such that the magnitude of each quantization matrix coefficient Q_{ij} is inversely proportional to a visual importance, I_{ij}, to the image of a corresponding DCT basis vector; and

(d) selecting a linear scaling factor S_{ij} defining bounds over which the image is to be variably quantized wherein $S_{ij} = l_{ij}(S_{max}-S_{min}) + S_{min,}$ where S_{max} and S_{min} are user selected;

(e) quantizing the transform coefficients, D_{ijmn}, to produce quantized blocks T_{ijmn} as follows:

(i) T_{ijmn}= round(D_{ijmn}/(S_{min}*Q_{mn})), where round denotes rounding to the nearest integer;

(ii) setting T_{ijmn} = 0 if round(D_{ijmn}/(Q_{mn}*S_{ij})) = 0; and

(iii) setting T_{ijmn} = sign(D_{ijmn})*(2^(ceil(lg(abs(D_{ijmn})+1))-1)-1) if abs(D_{ijmn}) - (2^(ceil(lg(abs(D_{ijmn})+1))-1)-1) is less than or equal to (abs(D_{ijmn}- Q_{mn} * S_{ij} * round(D_{ijmn}/(S_{ij}*Q_{mn}))));

(f) entropy encoding quantized coefficients T_{ijmn} and Q *S_{min}, to create a JPEG image file.

8. A method of JPEG compression of a colour image represented by channels Y for greyscale data, and U and V each for colour, comprising:

(a) shrinking the colour channels U and V by a fraction of their size;

(a) forming a discrete cosine transform (DCT) D_{ij} for each block B_{ij} of each of channels Y, U and V;

(b) calculating a visual importance, I_{ij}, for each Y channel block of each image and setting I_{ij} = max{ I_{ij} values for

corresponding Y channel blocks} for blocks in the U and V channels;

(c) forming a global quantization matrix Q for the Y channel block and one for channels U and V combined such that a magnitude of each quantization matrix coefficient Q_{ij} is inversely proportional to an importance in the image of a corresponding DCT basis vector; and

(d) quantizing the transform coefficients for each of the Y, U and V channels by dividing them by a factor S_{ij} Q', where S_{ij} is a linear scaling factor for each of channels Y, U and V and Q' is the quantization table for the associated channel being quantized; and

(e) entropy encoding quantized coefficients T_{ijmn} and $Q'*S_{min}$, where S_{min} is a user selected minimum scaling factor for each of channels Y, U, and V, to create a JPEG image file for each of channels Y, U and V.

9. The method of claim 8 wherein the shrinking factor is 1/2.

10. Apparatus for JPEG compression of an image frame divided up into a plurality of non-overlapping, tiled 8 x 8 pixel blocks B_{ij} where i, j are integers covering all of the blocks in the image frame, comprising:

(a) a discrete cosine transformer (DCT) operative to form the deiscrete cosine transform of each block B_{ij} of the image frame to produce a matrix of blocks of transform coefficients D_{ij};

(b) a visual importance calculator operative to calculate the visual importance, I_{ij}, for each block of the image, based upon assigning zeros for flat features and values approaching unity for sharply varying features;

(c) a global quantization matrix calculator operative to calculate the global quantization matrix, Q, by one of

(i) selecting a standard JPEG quantization table and

(ii) selecting a quantization table such that the magnitude of each quantization matrix coefficient Q_{ij} is inversely proportional to the importance in the image of the corresponding DCT basis vector; and

(d) a linear scaling factor calculator operative to determine a linear scaling factor, S_{ij}, defining bounds over which the image is to be variably quantized based on user established values of S_{max} and S_{min};

(e) a quantizer operative to divide the transform coefficients, D_{ijmn}, by a value equivalent to dividing them by a factor $S_{min}*Q$, where S_{min} is a user selected minimum scaling factor, and

(f) an entropy encoder operative to encode the quantized coefficients T_{ijmn} and $Q*S_{min}$ to create a JPEG image file.

11. Apparatus according to claim 10, wherein said quantizer rounds $(D_{ijmn}/(S_{min}*Q))$ to the nearest integer to form quantized DCT transformed coefficients T_{ijmn} and

(a) sets $T_{ijmn} = 0$ if $round(D_{ijmn}/(Q_{mn}*S_{ij})) = 0$; and

(b) sets $T_{ijmn} = sign(D_{ijmn})*(2\text{^}(ceil(lg(abs(D_{ijmn})+1))-1)-1)$ if $abs(D_{ijmn}) - (2\text{^}(ceil(lg(abs(D_{ijmn})+1))-1)-1)$ is less than or equal to $abs(D_{ijmn}- Q_{mn}S_{ij} * round(D_{ijmn}/(S_{ij}*Q_{mn})))$;

12. Apparatus according to claim 10, wherein said linear scaling factor calculator determines a linear scaling factor S_{ij} equal to $I_{ij}*(S_{max} - S_{min})+ S_{min}$ where S_{min} and S_{max} are user specified to define bounds over which the image will be variably quantized.